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THE FISH OF LAKE ELLESMERE, CANTERBURY

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ABSTRACT

The fishes of Lake Ellesmere, a large brackish water lake in Canterbury, New Zealand, are listed and notes on the abundance and breeding status of each species are given. One previously unrecorded resident, the carp, *Carassius* sp. is noted.

INTRODUCTION

Lake Ellesmere, a brackish water lake (45° 45' S, 172° 30' E) is New Zealand's fifth largest lake. It is about 26 km long and has a maximum width of 13 km. A shingle bar, Kaitorete Spit, separates the lake from the sea but is highly permeable and as a result the lake is brackish, with salinity increasing from south to north. The North Canterbury Catchment Board ensures that the lake level is kept at 1.05 m above mean sea level (m.s.l.) from August to March inclusive and 1.12 m above m.s.l. from April to July (Tunnicliffe 1973). Lake levels above these necessitate opening the spit at the narrowest (southernmost) part to allow water to flow out. The lake remains open until the sea blocks the opening with shingle deposits, usually within a month. The composition of the fish fauna appears to be largely dictated by the length of time the lake is open to the sea.

The lake has an extremely rich and varied fish fauna. Only species of economic or sporting importance, however, have been studied. Percival (1937) studied the effect of stripping brown trout, *Salmo trutta* (for hatchery purposes) on the size and number of the lake stock and concluded it had no significant effect. Hobbs (1947) worked on the numbers and relative proportions of male and female migrant short-finned eel, *Anguilla australis schmidtii* and long-finned eel, *Anguilla dieffenbachi*, while Gorman (1960) studied the flatfish, *Rhombosolea* sp. population and (Gorman 1962) the yellow-eyed mullet, *Aldrichetta forsteri*. No published work appears to exist on any other species.

STATUS OF FISH SPECIES

Twenty six species are reported from the lake. These comprise eight frequent visitors, two which have been reported once, and 16 residents. Of the residents, eight are assumed to breed in the lake, six almost certainly breed at sea, and two migrate up rivers. Two further species, although as yet unrecorded, are likely to be found in the lake.

RESIDENTS

Lake residents, as distinct from "visitors" which enter when the lake is opened, include the short-finned eel, *Anguilla australis schmidtii* and the long-finned eel, *A. dieffenbachi*. These are found throughout the lake although the short-finned eel is much more common and is the basis of a thriving fishing industry. It is likely that the long-finned eel lives mainly in streams draining into Lake Ellesmere as the proportion of long-fins in the catch increases markedly during their migration period. Both species migrate to breed, probably to around New Caledonia (Castle 1968).

Yellow-eyed mullet, *Aldrichetta forsteri*, commonly known as herring, is fished in the winter when eels are torpid and cannot be caught in commercial quantities. Mullet apparently breed in the lake and spawn during the summer months (Gorman 1962).

Three species of flounder are present: black flounder, *Rhombosolea retiaria*; common flounder, *R. plebeia*; and yellow belly, *R. leporina*. During 1973 catches fell considerably and local fishermen believe that many fish left the lake on the last opening of the spit. Gorman (1960) does not believe that any flounder species spawn successfully in the lake although he collected eggs presumed to be those of *R. plebeia* in September 1959. When salinity drops, development of young apparently stops. Specimens of *R. plebeia* collected by the author in June and July 1973 were heavily gravid and collections of benthos made by M. Field-Dodgson (pers. comm.) in August 1973 revealed eggs that may have been those of *R. plebeia*. Gorman (1960) states that *R. leporina* has difficulty spawning in shallow water and *R. retiaria* is not known to spawn in the lake although fishermen contend that they ascend rivers to spawn.

The introduced brown trout, *Salmo trutta* is the basis of a large sport fishery. In autumn and winter it moves into streams to spawn, and the Selwyn River run (the Selwyn is the largest river draining into the lake) has been estimated at 60,000 fish (Burnet *et al.* 1969). Another introduced salmonid, the quinnat salmon, *Oncorhynchus tshawytscha*, has also been reported but the small number caught by sport fishermen suggests it is extremely rare. If it does breed it probably runs up the Selwyn to spawn rather than spawning in the lake. Common smelt, *Retropinna retropinna* and two species of Eleotridae, the giant bully, *Gobiomorphus gobioides* and the common bully, *G. basalis*, are common and probably provide the main food for larger carnivorous fish. The giant bully appears to be more common than the common bully in the lake while the reverse is the case in inlet streams. There is no obvious reason why Stokell's smelt, *Stokellia anisodon* should not also occur as the lake appears to provide an excellent habitat for *retropinnids*.

Gorman (1960) and Burrows (1969) have reported the presence of *Galaxias maculatus* but the author has seen only one specimen. Overexploitation of the young of *Galaxias* spp. (whitebait) has possibly severely reduced the resident population as catches during the 1973 season were the poorest which can be remembered. *G. argenteus* occurs in streams flowing into Lake Ellesmere

(Burnet *et al.* 1969) and although it has not been reported in Lake Ellesmere it may occur there as it is known to live in lakes (Woods 1963). The life cycle of *G. argenteus* is insufficiently understood to indicate whether young are likely to be living in the lake.

Sprat, *Maugaclupea antipodum* is common in the southern, more saline, region of the lake but Gorman (1959-60) states that it probably does not occur in commercial quantities and would be difficult to exploit. Carp, which have not been recorded before, are sometimes caught in eel fyke nets. These are difficult to identify but are probably *Carassius carassius* x *auratus* hybrids. Perch, *Perca fluviatilis* are common and are esteemed by fishermen for their flavour. They apparently grow to large size and fish of 1 kg are not uncommon. Both carp and perch are introductions which breed in the lake.

Kahawai, *Arripis trutta* are not common but those examined by the author did not show any obvious sign of stress from the low salinity of the lake.

VISITORS

When the spit is open, marine fish frequently enter during the few weeks before wave action closes it. Some probably die almost immediately and are not caught or seen, but others seem to survive quite well. Fairly common visitors are greenback flounder, *Rhombosolea tapinha* and common sole, *Peltorhamphus novaezeelandiae* both of which are occasionally caught by flounder fishermen. As James (1972) has recently redescribed the genus *Peltorhamphus* to include two new species, *P. latus* and *P. tenuis* it seems probable that some of the *P. novaezeelandiae* reported from the lake belong to these species. Red cod, *Physiculus bachus* have also been taken and a sunfish, *Mola mola* was caught in the lake in the channel opposite Taumutu village (D. Nordstromm pers. comm.).

Elasmobranchs are frequently reported and spiny dogfish, *Squalus acanthias*; rig, *Mustelus antarcticus*; elephant fish, *Callorhynchus milii*; and skate, *Zearaja nasuta* have been reported by Gorman (1959-60). A single report of a 5 metre long basking shark, *Halsydrus maximus maccoyi* is known.

The lamprey, *Geotria australis* (Cyclostoma) is included in the checklist because individuals sometimes pass through the lake on their spawning migration if the spit is open (K. Nordstromm pers. comm.)

CHECKLIST

Nomenclature for Eleotridae and Retropinnidae follows McDowall (1966, 1972). Other species after Hewitt and Hine (1972).

Petromyzonidae

Geotria australis (lamprey)
Status: Occasional migrant en route to spawning grounds.

Triakidae

Mustelus antarcticus (rig)
Status: Occasional visitor.

Halsydridae

Halsydrus maximus maccoyi (basking shark)
Status: One record.

Squalidae

Squalus acanthias (spiny dogfish)
Status: Occasional visitor.

Rajidae

Zearaja nasuta (skate)
Status: Occasional visitor.

Callorhynchidae

Callorhynchus milii (elephant fish)
Status: Occasional visitor.

Clupeidae

Maugaclupea antipodum (sprat)
Status: Resident, probably breeding.

Salmonidae

Oncorhynchus tschawystscha (quinnat salmon)
Status: Rare resident.

Salmo trutta (brown trout)
Status: Resident, spawns in rivers entering lake.

Retropinnidae

Retropinna retropinna (common smelt)
Status: Common, resident spawner.

Galaxidae

Galaxias maculatus (inanga)
Status: Uncommon resident spawner.

Anguillidae

Anguilla dieffenbachi (long-finned eel)
Status: Resident, migrates to sea to spawn.

Anguilla australis schmidtii (short-finned eel)
Status: Common resident, migrates to sea to spawn.

Gadidae

Physiculus bachus (red cod)
Status: Occasional visitor.

Rhombosoleidae

Rhombosolea retiaria (black flounder)
Status: Resident, possible spawner.

Rhombosolea leporina (yellow belly)
Status: Resident, possible spawner.

Rhombosolea plebeia (common flounder)
Status: Resident, possible spawner.

Rhombosolea tapirina (greenback flounder)
Status: Occasional visitor.

Peltorhamphus novaezeelandiae (common sole)
Status: Occasional visitor.

Mugilidae

Aldrichetta forsteri (yellow-eyed mullet)
Status: Common, resident spawner.

Arripididae

Arripis trutta (kahawai)
Status: Frequent visitor.

Eleotridae

Gobiomorphus gobioides (giant bully)
Status: Resident spawner.

Gobiomorphus basalis (common bully)
Status: Resident spawner.

Cyprinidae

Carassius carassius x *auratus* (goldfish or carp)
Status: Resident spawner.

Percidae

Perca fluviatilis (perch)
Status: Resident spawner.

Molidae

Mola mola (sunfish)
Status: One record.

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